AGRICULTURAL NEWS LETTER

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This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations by the Du Pont Company. It also contains published reports of investigators at agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.

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AGRICULTURAL NEWS LETTER

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The AGRICULTURAL NEWS LETTER serves as a medium of reporting new developments and new ideas in the field of agriculture, particularly as they are related to advancements through research. Material appearing herein may be reprinted in whole or in part, in the interest of advancing the general knowledge of new agricultural practices.

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WHAT FARM EDITORS ARE SAYING --

"It is in the field of livestock where the agricultural chemicals can save American agriculture billions of dollars. It is impossible to guess the cost to beef-cattle men of screwworms, ticks, lice, horn-flies, and warbles; the cost to hog producers of roundworms and other parasites; the cost to poultrymen of lice, mites, and ticks. We now have chemicals with strong enough muscles to control all these things if they are used and if they are used properly." -- Robert H. Reed in BETTER FARMING

"Regardless of one's attitude toward the increasing influence of science on our life, it is here and it is important. That influence is likely to become more important in the future. It must. We see only the grimmest of prospects for a 1980 world of more than 3.5 billion people (there were about 2.5 billion in 1950), should we advance no further with the uncovering and application of new knowledge." -- Walter J. Murphy in JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY

"Agriculture needs more research to keep pace with industry in our economy, to develop new uses for agricultural products, to stay healthy. Consumers must be informed of what they stand to gain, along with agriculture from this research. Only thus will agricultural research get the universal support it deserves." -- Marvin Russell in COLORADO RANCHER AND FARMER

"Money spent for research generally always comes back manyfold. A speedup in our research program will mean that we will find new things and new ways of doing our work much faster." -- Paul C. Johnson in PRAIRIE FARMER

"Research could well rank with soil, water, air, and sunshine as a fifth fundamental resource of agriculture. All progress is related to this vital field of activity, and we must recognize this if we are to continue to improve our standard of living. -- Fred I. Jones in INDIANA FARMERS GUIDE

"Let Russian farmers and technicians visit Iowa. Iowans will be glad to show them that one way to increase hog production is to abolish Russia's enormous farms and go back to the family-sized kind." -- WALLACES' FARMER AND IOWA HOMESTEAD

* * * * * IN THIS ISSUE * * * * *

NEW FERTILIZER COMPOUND COMBINES

HIGH NITROGEN CONTENT WITH PROLONGED RELEASE RATE

A remarkable new fertilizer material which will release adequate nitrogen for plant growth and vigor continuously and uniformly through the entire growing season has just been announced by the Polychemicals Department of the Du Pont Company.

The new material is the product of 17 years of research and development work by Du Pont scientists, with the cooperation of state experimental stations, the U. S. Department of Agriculture, golf course superintendents, and professional horticulturists. It combines a 38 per cent nitrogen content with a prolonged release rate never previously achieved by any nitrogen fertilizer.

Trademarked "Uramite," this fertilizer compound is being manufactured in new plant facilities at Belle, West Virginia.

While agricultural uses for "Uramite" fertilizer compound are anticipated in future years, initial supplies will probably be marketed to turf specialists and growers of ornamental plants, where the slow release rate is of particular importance.

Chemically, "Uramite" is a mixture of methylene ureas, almost completely insoluble in water. In the soil, however, "Uramite" is dissolved slowly over a period of months at at rate conformable with moisture and temperature. During this period,

The dark strips of turf in the photo above were treated with "Uramite" fertilizer compound at the rates of 20, 30 and 40 pounds per 1,000 square feet respectively, reading from left to right. This is five to 10 times more nitrogen than can safely be applied at one time when ordinary fertilizer sources of nitrogen are used. Yet no injury resulted from these heavy applications of "Uramite." On the contrary, prolonged release of the nitrogen produced healthy turf through the summer, while summer drought conditions took a heavy toll in areas where "Uramite" was not applied. In many regions, maximum yearly requirements of nitrogen can be supplied with a single application of only 10 pounds of this new material per 1,000 square feet.

Using hydrangeas as test plants, this photo shows the controlled growth rate obtainable with "Uramite" fertilizer compound. Plant at left was the control which received no "Uramite." Next plant received a half-teaspoonful, the next one a full teaspoonful, and the plant on the right a tablespoonful. The even release of nitrogen by "Uramite" was found to result in compact, hardy foliage. Flowering was neither retarded nor impaired.

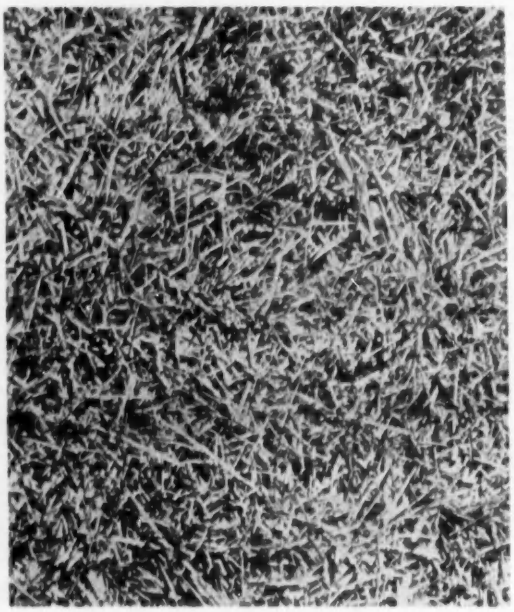
its nitrogen is gradually converted to a form which is available to plants.

Through exhaustive field tests in all sections of the country, "Uramite" has been found to produce a durable, attractive, healthy turf, with its attendant resistance to disease and weed infestation. These results are equally apparent during both adverse and normal weather conditions. Sufficient "Uramite" for an entire season's nitrogen needs may be supplied in one application in most regions of the country. In tests, however, two to three times this amount has been used without injury to plants.

Ornamental plants treated with "Uramite" have shown outstanding responses. Sturdier growth with compact, hardy foliage, and full flowering were observed where it was used. No injury to plants resulted when normal nitrogen requirements for six or more months were supplied in one application.

Because of its high nitrogen content, only about 10 pounds of "Uramite" fertilizer compound per 1,000 square feet of turf are required for the entire season. About three pounds of "Uramite" per 100 square feet of bed area are sufficient for most ornamentals.

During the course of developing this new material, investigators found that the measurement of quality is of particular importance in fertilizers derived from urea and formaldehyde -- the raw materials from which the methylene ureas are made. This is true because many materials, only a few of



Top photo shows a strip of turf on which recommended amounts of conventional soluble fertilizer was used. First overstimulated, then starved for nitrogen, this turf was unable to cope with midsummer temperatures and drought, with resultant thinning, disease and weed growth. Lower picture shows an adjacent strip of turf where "Uramite" application produced dense growth and good color.

which have fertilizer value, can be produced by combining urea and formaldehyde.

A chemical means for characterizing the fertilizer values of such materials has now been devised through the joint contributions of the USDA, state experimental stations, and the Du Pont Company. This evaluation is expressed numerically as an "Activity Index." Fertilizer control officials have already adopted this index to define acceptable quality limits for this new type of fertilizer. It is arrived at by a routine chemical method, results of which correlate closely with the wide-spread greenhouse and field tests which have been conducted.

Extensive evaluation of the fertilizer values of reaction products of urea and formaldehyde has been carried on in the turfgrass field by Professor H. B. Musser of the Agronomy Department of Pennsylvania State University, and by Dr. V. T. Stoutemeyer of the Department of Floriculture of University of California, located at Los Angeles. Evaluation of these products as their use might pertain to ornamental plants was stressed particularly by Dr. O. R. Lunt of the Department of Irrigation and Soils at the Los Angeles division of University of California, and by James A. McFaul of the Agricultural Extension Service in Mineola, N. Y.

Initial distribution of "Uramite" fertilizer compound is expected to be made through firms already well established in professional turfgrass and horticultural fields.

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PROGRESS -- INDUSTRIAL, AGRICULTURAL, AND HUMAN

By Harold Brayman
Director, Public Relations Department
E. I. du Pont de Nemours and Co., Inc.

Note: The following article is exerpted from an address by Mr. Brayman before the recent annual West Virginia Industrial Development Conference. Full text of the speech will be sent on request.

There is no argument about the desirability of progress. But there is a widespread lack of understanding of methods that will achieve the desired result.

To me it seems like a very simple proposition. If the people of the United States want to continue to increase their standard of living and continue to develop cultural and social opportunities, the basic problem is to produce more. Only when we produce more can we have more, and the primary way to produce more is to expand and improve facilities for production.

Of course pessimists and some special interest groups try to convince us that we face the danger of overproduction. They even suggest that we have a mature economy. Some argue that improved technologies which enable us to make more products with less human effort will lead not to abundance, but to unemployment. The truth is quite the contrary.

As a matter of fact, I can think of no technological advancement that has replaced an older method that has not eventually multiplied employment opportunities by opening whole new fields of production. Mass production of automobiles may have created unemployment among wagon builders, but think of the vast new employment it created in the end.

What we need is more and better production methods. We must find ways to produce enough more to look after needs of a population expanding at the rate of about 2 1/2 millions a year and, at the same time, to continue to improve the standard of living which has been rising at the rate of about 2 1/2 per cent a year.

This can be accomplished only through the application of our natural resourcefulness, through bringing our technical capacities to more of our people, through lowering our costs and improving the performance of our industry.

Our own history demonstrates this very well in agriculture, the basic industry. In 1800 it took nine men on the farm to produce enough food for themselves and for one person in the city. That meant that only one out of 10 in our population could be producing the other necessities and luxuries of life, or devoting himself to education and other cultural pursuits. Today the situation is that one man on the farm pro-

duces enough food for himself and 17 others. That means that millions of people can devote themselves to production of goods which we did not have in 1800, many of them in the luxury classification, or to education or other cultural or recreational pursuits.

And why? The answer is that in 1800 the man on the farm was utilizing, virtually unchanged, the agricultural methods that had been in use from the time of the Roman empire, while today the farm has become very largely a mechanized project, using the latest scientific methods.

The newspapers recently reported the case of a farmer near Champaign, Illinois, who with power machinery and the assistance of one man farms 420 acres. When he started out in 1933, it took five men and 20 horses to do a poorer job.

A survey by the University of Illinois shows that in the last 25 years, the number of acres tilled by one man has increased from 113 to 149, while the yield of corn per acre has gone up 37 per cent, soybean harvests 74 per cent, and wheat yields 41 per cent. For the nation, Assistant Secretary of Agriculture Earl L. Butz reports that since the beginning of the Second World War, "American farmers have increased their total production by 35 per cent with no increase in acres."

Because of the technological developments of recent decades, our whole system of living has been changed and greatly improved for the better. In 1900 it was customary for both the husband and the wife in nearly every family to work from dawn to dusk or longer. On the farm or in the factory the 10- to 12-hour day was standard, six days a week.

What a difference we see today. Productivity has been tripled since the turn of the century by technological gains introduced by industry. Machines turned by electric motors do the heavy work in the shops just as they do in the homes. Since these new machines and new processes have cut costs and enable a man to turn out far more products in far less time, his employer pays much higher wages for a standard eight-hour, five-day week. If he is on the day shift, the sun is up when he goes to work and it is still up when he drives home in the evening to dig in the garden.

Our families who live in rural areas are no longer isolated from the cultural and recreational pursuits of the city. My own lifetime just about spans that period, for I was born in 1900 just about the time the first motor cars were produced. I was born in an agricultural county in upstate New York 40 miles from the capital city of Albany. I have no statistics to prove this, but I am sure that in 1910 when I was a schoolboy, three out of every four of the adult population of that county had never in their lifetimes been to the City of New York. Yet New

York was only 150 miles away, and today you can drive it in an automobile in 3 1/2 hours.

The real revolutionists in the age in which we live have not been Nikolai Lenin and Joseph Stalin. These men were merely reactionary throwbacks to the medieval terrors of a Genghis Khan -- reactionary throwbacks disguised in a new false face, designed by Karl Marx, a false face which deceives people into believing that the way to progress is a return to the autocratic state where no man is free.

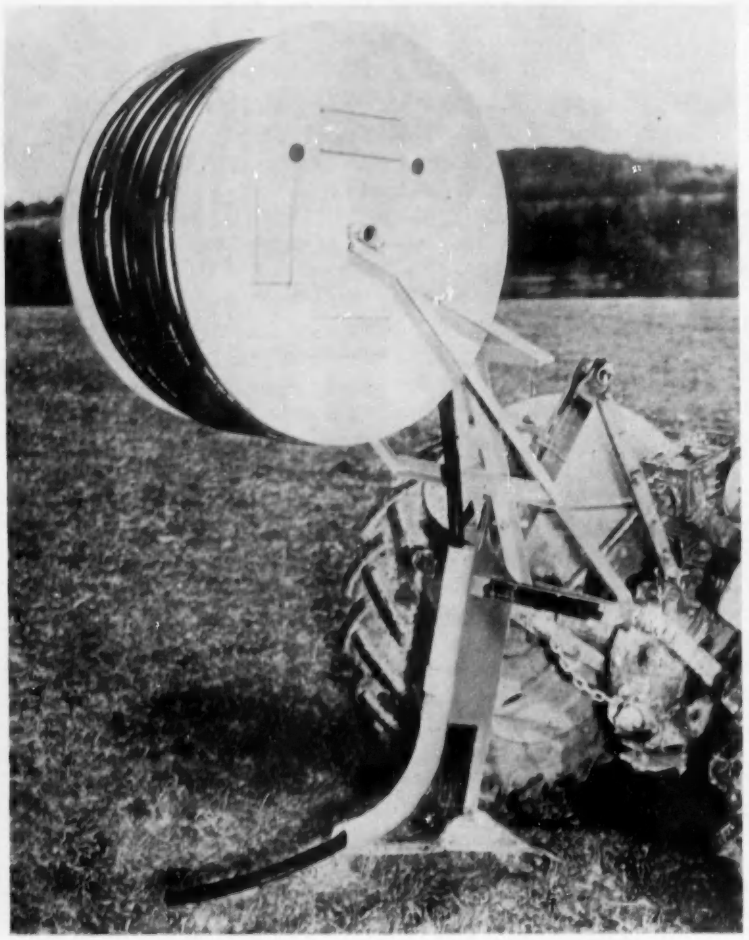
No, the real revolutionists of our day have been the Henry Fords, the Pierre S. du Ponts, the Alfred P. Sloans -- the men who provided the leadership and the welding together of a great many necessary and vital skills into the ultimately successful effort of the mass production of automobiles; and all the other industrial leaders and their associates in science and business who, by backing and organizing the technologists, have changed our whole lives by the developments of the twentieth century. They have been the real revolutionists.

Now I do not want to be misunderstood. I am not saying here that all's well with the world and we can rest on our laurels as we are. Far from it. There are injustices and frustrations which need to be corrected. There are many changes and improvements which need to be pushed. There are new developments that will require much ingenuity and skill. We have only reached a little hilltop from which we can see far horizons. But, if we will continue to place our reliance not on demagogic tricks, or fancy panaceas, but on methods which enabled us to get to that hilltop, we can and shall and will reach the new horizons.

CHEMICAL CONTRIBUTIONS TO FARMING HAILED

Chemical compounds that enrich the soil, control insects, and contribute to increased meat and dairy production rank among the 10 most useful chemical developments of the last 35 years, according to a panel of nine experts from the fields of science, education and publishing.

The selections were made in connection with Chemical Progress Week, celebrated throughout the country in mid-May. In all, 27 developments were singled out by the panel as significant contributions to our modern way of life. Leading the list were synthetic fibers, antibiotics, and synthetic plastics, but in the top 10 were synthetic fertilizers, insecticides, and feed compounds developed through chemical research.



Here's a new device that will save digging pipe lines. It will lay polyethylene pipe 14 to 20 inches deep, and cover it in the same operation, as fast as 100 feet a minute. Hitches on to any farm tractor.

NO BACKACHE IN LAYING POLYETHYLENE PIPE NOW

From time to time this news letter has reported advantages of polyethylene pipe. Here's another advantage: You can now lay this pipe with a tractor!

A company in Franklin, Pennsylvania, which manufactures pipe from Du Pont's "Alathon" polyethylene resin, has developed a continuous pipe-laying tractor attachment. Operating at tractor speeds, it will uncover a trench, lay in the pipe 14 to 20 inches deep, and back-fill leaving only a slight mound in the field. Pipe can be buried at the rate of 100 feet per minute. In fact, at one demonstration a thousand feet of pipe was installed in less than 10 minutes.

Spools holding 600 feet of pipe are mounted on the implement bracket. The pipe feeds into the ground through a tube behind a blade similar to a subsoiler. In fact, the manufacturer suggests that by removing the guide tube it can be used for subsoiling. It can also find use in burying underground-grade electrical cable. The pipe-laying tube will accommodate pipe sizes from half-inch through one and a quarter inches.

With this equipment, combined with the flexibility and good service life of polyethylene pipe, it is feasible to make temporary installations to be removed later and relocated, it is pointed out. The pipe-layer is constructed for a three-point hitch, but can be adapted for any farm tractor. It sells at just under $100.

METHOXYCHLOR RESIDUE TOLERANCE

By H. J. Thome
Agricultural Service & Development
Grasselli Chemicals Department
Du Pont Company

After thorough investigation over a period of about five years, including lengthy public hearings, the Federal Food and Drug Administration early this year published residue tolerance for all widely used pesticides. The levels for members of the class of chlorinated hydrocarbon pesticides range from 0.1 to 14 parts per million. Methoxychlor received a tolerance of 14 parts per million for nearly 50 fruits and vegetables.

Copper based fungicides, and about a dozen other pesticides, as used today, were found to constitute no hazard and these were exempted from tolerance requirements.

As a specific control for many destructive insects, methoxychlor has already found a place in the production of high quality raw products for freezing and canning. Its low toxicity confirms its place in the production of crops for processing.

For almost all fruit and vegetable crops, methoxychlor controls the same general groups of insects as DDT, with some important differences. For example, methoxychlor is particularly effective against Mexican bean beetle and plum curculio, which are not well controlled by DDT. Furthermore, it does not tend to injure young cucurbit plants. However, methoxychlor should not be expected to control pea aphids and potato aphids, which have been controlled by DDT.

Where a methoxychlor program is recommended, it will give control up to harvest, even where applications are stopped a week or more before. Timing and dosages as recommended on methoxychlor product labels have been found to achieve insect control and still meet the 14 ppm. residue tolerance at harvest under normal commercial growing conditions. The usual spray recommendation is two to three pounds of 50 per cent wettable powder in 100 gallons of water. A five per cent methoxychlor concentration is common in dust preparations. With these concentrations, applications at intervals of one to two weeks usually give good commercial control. In the instances where residues from dusts and sprays have been compared, dusts generally show a lower initial residue level, and the residues weather more rapidly than those from spray applications.

A number of other factors may also affect the amount of residue in the harvested crop. Recommendations provide for at least seven days between the last application and the beginning of harvest. The longer the time between application and harvest, the lower the residue. Then too, certain crop characteristics will affect the amount of residue. Leafy crops, small fruits,

and young bean pods have a large proportion of surface to weight, and may hold a greater proportionate residue than other types of crops. Rough or pubescent surfaces (like raspberries or peaches) tend to retain higher residues than smooth surfaces. So as a matter of general practice, it is well to be particularly vigilant about residues of any chemical on apricots, peaches, leafy vegetables, small fruits, and bean pods.

The type of equipment used has an influence on residues, due to variation in the amount of chemical actually applied and its distribution over the sprayed crop.

As with most other chemicals, methoxychlor residues are reduced substantially by washing, blanching, or preparation for canning. This is a particular advantage with crops such as asparagus. It has been found in Delaware that two dustings with methoxychlor will control the asparagus beetle through the entire cutting season.

In experimental plots where asparagus was dusted and cut the same day, some samples of the unprocessed crop contained residues in excess of the maximum tolerance. However, washing and blanching brought the residue down below the tolerance.

For other crops which remain in the field longer, the residual insecticidal action of methoxychlor coupled with its low toxicity makes it possible to keep crops protected close to harvest. Snap beans, for example, are subject to severe damage from Mexican bean beetle and leafhoppers. Where beans are to be processed for baby food, it is common to stop spraying when pods are formed. Yet methoxychlor applied as recommended up to this stage will provide protection against both the beetles and the leafhoppers during the critical part of the growing season. For general commercial crop beans, studies indicate that an excessive amount of residue will not remain at harvest if applications stop seven days before harvest.

Young cucumber plants are subject to a great deal of damage by both striped and spotted cucumber beetles, and damage may continue right up until the time small cucumbers are harvested for pickling. Here again, commercial control has been achieved with methoxychlor applied according to recommendations. In Ohio studies, six applications of methoxychlor were used on cucurbits for control of cucumber beetles (Diabrotica) and melon and pickle worms. The residue approximately 12 days after final treatment was two parts per million.

Methoxychlor can also be used in a protective schedule for control of cabbage worms and cabbage looper on crucifer crops such as broccoli and cabbage. By controlling low infestations, protective applications of methoxychlor prevent destructive build-up which may require application of more toxic materials.

Methoxychlor has been used on apples in a schedule

starting with the calyx spray and running through late-season covers, for control of plum curculio and such insects as codling moth and apple maggot. Massachusetts investigators have found that this schedule leaves residues at harvest ranging from 1.5 to 1.9 parts per million.

A specific method has been developed for detecting methoxychlor even when other chlorinated hydrocarbons may be present. Named for the men who developed it, it is called the Fairing-Warrington method. A quick qualitative test has also been developed to distinguish between DDT and methoxychlor either as residues or formulations. This is based on the Fairing-Warrington method, and is capable of detecting less than one microgram of methoxychlor. The qualitative test is simple enough for use in identifying methoxychlor residues in the field.

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Editor's Note: A booklet entitled "Methoxychlor: A Summary of Analytical Methods" has been prepared by Du Pont. This booklet includes both general and specific methods of analysis, including a complete description of the Fairing-Warrington method. Modifications of these methods which have proven useful in analyzing for methoxychlor residues in different types of food matter (e.g. fruits, vegetables, forage crops, mushrooms, milk, butter, and animal fat) are also included. A copy will be sent on request.

SPIRITUAL UPTURN ACCOMPANIES IMPROVED LIVING CONDITIONS

Critics of modern America, who say we are not as religious, as a nation, as folks were in the "good old days" are not devoting much thought to this matter, it is pointed out in the current issue of "Better Living," the Du Pont Company's employee magazine.

"In 1850, only 15 per cent of the U. S. population belonged to a church," the magazine cites. "Today, more than 55 per cent are members."

And along with this spiritual upturn, our American system of free enterprise, which guarantees us indivdual freedom just as it places a premium on individual initiative, has been the means of providing many improvements in the conditions affecting the daily lives of all of us, the "Better Living" article declares.

"One hundred years ago, men worked from sun up to sun down to earn their bread. . . A paid vacation was yet to come. The poor were auctioned as bonded servants. The mentally ill went to jails. Museums, concerts, even books, were only for the very rich. . .Few owned their homes. Health was poor, life expectancy was low. In short, man's lot left much to be desired."

MORE HAY FOR NORTHERN STATES

The availability of winter-hardy and wilt-resistant varieties of alfalfa, combined with proper cutting, fertilization, and insecticide spraying practices, now enables Wisconsin farmers to cut hay earlier and to get an extra cutting from their fields, according to Dr. Dale Smith of the Agronomy Department at the University of Wisconsin.

"In the past," Dr. Smith points out, "with only the hardy but wilt-susceptible varieties available, long-time results showed that two cuttings per season gave best results in maintaining vigorous, productive, and long-lasting stands. The most favorable schedule was a first cutting in late June and a second in middle to late August. This helped maintain strong stands since winter injury and thinning of stands by bacterial wilt are closely associated. Cracks in roots and crowns from winter injury are the means of entrance into the plant for the wilt bacteria."

But with the newer winter-hardy and wilt-resistant varieties of alfalfa now available, farmers in the northern states can take a first cutting off in early June, so long as there has been no severe winter injury. This enables them to get three cuttings per season instead of two, with a resultant 20 to 50 per cent increase in hay tonnage.

Based on Wisconsin observations, Dr. Smith outlines five points to consider when three cuttings are contemplated:

1. Plant the winter-hardy and wilt-resistant Vernal or Ranger varieties.

2. Maintain a high level of soil fertility by adequate fertilization at seeding and by top-dressing at least every other year since the soil fertility will be depleted more rapidly.

3. The second hay crop should be sprayed with an insecticide that is not harmful to livestock, such as methoxychlor, in order to protect the crop from invasion by potato leafhoppers.

4. If stand was winter-injured, delay cutting until late June or full bloom, though it means only two crops that year.

5. Remove the third cutting no later than the first week in September, or delay cutting until October. In order to have the third cutting removed prior to early September, each of the three cuttings can not be made later than the stage where the crop is only about one tenth in bloom.

In explanation of the third-cutting timing expressed under the last point, Dr. Smith declares that "September and early October are critical months in the growth of alfalfa under any system of management in the northern states. Alfalfa needs its top growth during this period to manufacture foods that are stored in the roots and crowns. These foods are used for energy to develop cold resistance and to keep the plants alive over winter."

MODERN METHODS SELL MORE FRESH PRODUCE

Science and the produce grower have been teaming up to offer Mrs. Shopper fresher, better quality vegetables this past spring, and their efforts are reported to be paying off in increased sales in the nation's markets.

The prime contributions of industrial research, helping growers win new markets and better acceptance for their product, are in the fields of refrigeration and packaging -- areas where chemical developments that led to the availability of special types of cellophane and "Freon" fluorinated hydrocarbon refrigerants have paved the way for produce marketing developments of vital importance to the nation's economy.

On their part, the growers have made use of new, improved varieties of vegetables developed through research in plant breeding, and have employed modern fertilizers, pesticides, irrigation methods and harvesting equipment to grow bigger and better crops.

West Coast lettuce growers were among the leaders in the current trend to supply shoppers with "garden-fresh" produce. They pioneered in the large-scale use of vacuum cooling and on-the-farm packaging techniques, combined with refrigerated warehousing and shipment in refrigerated trucks. This year these same techniques, with improvements and refinements to meet requirements of various crops, are being employed or tested in handling cauliflower, radishes, green onions, parsley, and green peas.

With other crops, point-of-sale packaging in cellophane to provide greater protection and sales appeal has been made possible through the development of new packaging machines. No longer need the housewife buy a head of cabbage or a bunch of grapes which have been handled by dozens of other shoppers. No longer need she pick over soppy wet produce, or throw away the outer leaves of lettuce. She can get crisp, clean, fresh vegetables of the size she desires, protected in their transparent,

Here's the way a small, compact, automatic machine introduced recently packages lettuce and other produce items before they are placed on display at the retail market. Shoppers testify that they like cellophane-wrapped produce because it is cleaner and more sanitary, can be stored in their refrigerator without rewrapping, makes shopping easier by eliminating the waiting for weighing and wrapping, and "there's no water to drip all over your clothes." As a result, they're buying more fresh fruit and vegetables.

cellophane jackets and ready to use, or to stow in the family refrigerator with no further handling -- and she's showing her keen regard for value by buying more fresh produce!

A good example of the modern way of handling and marketing these crops can be seen in the case of the Fudenna Bros., who are successfully marketing fresh cauliflower from their Irvington, Calif., ranches in New York, Philadelphia and other eastern cities this summer.

In less than two hours after the heads are picked in the field, Fudenna cauliflower has been trimmed, over-wrapped with printed cellophane, vacuum cooled and is ready for shipment.

Only through improved methods constantly being developed through industrial technology and research could such an accomplishment come about. Previous attempts in recent years to find a workable formula for prepacking cauliflower at the producer level have failed. Moisture would collect on the inside of the cellophane wrapper as the contents cooled during shipment. This not only fogged the package but damaged the curd of the head and caused discoloration and deterioration.

Here's a big head of cauliflower being cut in the field at a Fudenna Bros. ranch, Irvington, California. Within two hours, this cauliflower will have been precooled, trimmed, wrapped in cellophane, vacuum cooled, and placed aboard a refrigerated truck on the way to market. Fresh cauliflower from this field has been arriving in "garden-fresh" condition in East Coast supermarkets this summer, thanks to the modern handling methods.

The secret to success in this case, it was found, lay in removing the field heat of the cauliflower. This retards physiological processes of the plant tissues, principally respiratory, which generate heat and produce gases. As a result the normal rate of deterioration is slowed down. Here's the way the process works at the Fudenna operation:

When the freshly picked heads arrive from the field they are put through a hydro-cooler and washer, where refrigerated water containing a solution of chlorine and calcium hydroxide is sprayed on the cauliflower

for 15 minutes. This serves to both cool the heads and to kill surface organisms which might cause spoilage.

Coming out of the cooler, the heads go onto a belt which moves them past women who carefully trim the leaves. Others wrap and heat-seal the heads in Du Pont cellophane on which the Fudenna brand names have been printed. Next they are packed in fiber cartons, perforated for air circulation, and are ready for vacuum cooling.

Into the huge vacuum cooling chambers go 240 cartons -- containing 2,880 heads -- of cauliflower at a time. They enter at temperatures of from 59 to 63 degrees F. Through the normal evaporation produced by the hour-long vacuum process, they emerge at from 35 to 37 degrees and are moved directly into Fudenna's own refrigerated trucks or into cold storage at the plant.

From the standpoint of the grower, Fudenna Bros. point out some tangible advantages of this modern process.

It has lengthened the packing season so it is possible to ship as long as fresh cauliflower is available, whereas shipments previously were restricted to winter months.

It has eliminated the transportation cost of shipping tons of waste. A freight car can carry 60 per cent more saleable cauliflower -- 816 cartons of cellophane-wrapped heads as against 510 crates of untrimmed heads. Many unwrapped heads also arrive in damaged condition to further increase costs.

Then too, the printed cellophane overwrap supplies brand identification for a quality product, and promotes repeat sales to satisfied customers.

The Fudennas also report their new method of handling cauliflower has enabled them to sell their produce in new markets they have never reached before

This is the final trimming process in the packing house at the Fudenna ranch. The cauliflower has previously been hydro-cooled to reduce field heat. Next, it will be wrapped and heat-sealed in cellophane which bears a Fudenna brand. The trimming and packaging has increased the number of heads which can be shipped by refrigerated freight car by 60 per cent, with accompanying savings in transportation costs.

Here go 240 cartons of Fudenna cauliflower into the vacuum cooling chamber where they will be cooled to between 35 and 37 degrees during the hour-long process. They'll emerge ready for shipment to market.

throughout the United States and Canada. While they packed only about 50 per cent of their 1955 crop in this manner, next year they plan to market around 90 per cent of the crop, or 150,000 dozen heads of cauliflower, in the prepackaged, precooled form. Meantime, precooling tests they have been conducting with radishes, green onions, parsley, and green peas indicate they may get into this same type of operation with those vegetables in another year.

This development in the field of fresh produce marketing is just one example of the trend toward higher quality and more convenient food items -- a trend that is growing in momentum in the food industry.

In a recent nationwide survey among leading grocery manufacturing companies, undertaken by General Foods Corporation, 63 per cent of the executives interviewed named "new product development" as the area to receive the most attention in their companies over the next 10 years. This increasing attention to research and development in the food field, according to the survey, may be expected to result in: (1) more "convenience" foods, (2) advances in the technology of growing food, (3) the application of atomic science to food growing and processing, (4) increasing use of automatic processing equipment, (5) more efficient distribution, and (6) more supermarkets.

One of the broadest areas of agreement in this survey was on the subject of technological changes in the growing of crops. Significant advances in growing techniques are expected by 87 per cent of the leading grocery executives.

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METHIONINE-ENERGY RELATIONSHIP

Specific Application of a New Nutritional Concept To Achieve Maximum Broiler Feed Efficiency

By Dr. James Waddell
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Since the introduction of the Connecticut Broiler Ration in 1947, high-energy feeds have come into widespread use in commercial broiler production. Broiler growers have found that feeds with increased productive energy (calorie) content can produce more meat in shorter time at less relative cost. A 15 per cent increase in calorie content has cut one-third off both the feed and the growing time required to raise a three-pound bird. Recently Maryland investigators have demonstrated that, under experimental conditions with all male birds, another third can be cut off feed consumption, and another 25 per cent off growing time.

Typical comparisons are shown in the following table:

	Typical Commercial Broiler Ration		Maryland * Experiment
	1940	1955	1955
Calories per lb.	800	900	1240
Protein Content (per cent)	21	21	27.1
To Raise a 3-lb. Bird			
Growing Time (Days)	91	60	52
Feed Consumption (Lbs.)	12	7.5	4.8
Feed Efficiency (Lbs. Feed per Lb. Meat)	4	2.4	1.6

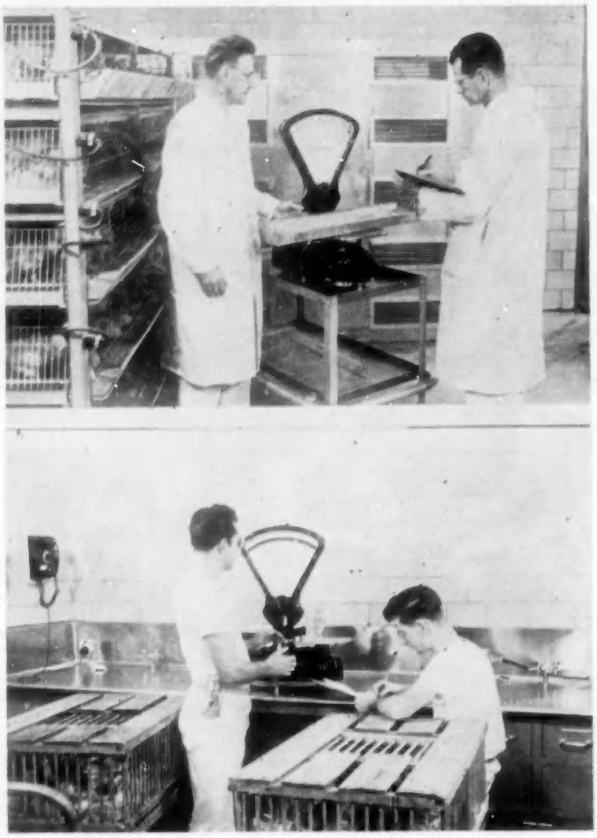
Thus calorie value takes its place beside a multitude of other factors which have been found to affect chick growth and the economics of poultry production in research and commercial experience over the past two or three decades. A balanced

* The Maryland investigators said, in part: "Without question, the use of rapidly growing broiler strain male chicks was important in achieving this rapid rate of growth and level of efficiency." The entire experiment was designed to demonstrate maximum performance without regard to present commercial practice. The typical figures in 1940 and 1955 are based on averages of mixed-sex groups.

poultry ration is no longer simply a see-saw with "protein" on one side and "total digestible nutrients" on the other. It is more like a pie plate on a pivot with vitamins, minerals, amino acids, and now calories, all to be balanced in proper proportions for the most efficient diet.

How is this nutritional balance affected when a faster growing chick is living on less feed? Does the bird get enough of all essential nutrients to (1) keep it healthy until it's ready for market, and (2) produce good market quality? Furthermore, are all nutrients in the ration balanced at proper levels for maximum feed efficiency -- in terms of meat production costs?

So far as critical vitamins and minerals are concerned, most commonly used feed formulas (which may contain up to 1,000 calories per pound) provide enough so that reduced total intake does not affect the health of the bird, market quality, growth, or feed efficiency.



These two pictures, taken at Du Pont's Stine Laboratory, illustrate the careful attention to detail essential in poultry nutrition research. Above, feed is carefully weighed; feed remaining in trough (if any) must also be weighed at end of test. Below, the weight of each individual bird is checked at regular intervals.

With protein as a whole, the problem is more serious and more complex. The outstanding performance reported by Maryland investigators was based largely on increasing the ratio of crude protein to energy content. However, "effective" protein value depends on the level of each essential amino acid in the ration. In most poultry diets, methionine is the first limiting component of an effective protein. When feed intake is reduced by an increase in energy content of a diet in which methionine content is already near the critical level, the bird may suffer from a methionine deficiency. In other words, methionine has to be balanced not only against the other amino acids in the diet, but also against the calorie content.

On the basis of experiments at the Du Pont Company's Stine Laboratory, a rule of thumb can be used to estimate the most

effective level of methionine for maximum performance. When the calorie content of a practical poultry ration containing about 21 per cent protein is increased by 100 calories per pound, the methionine content should be increased by about 0.07 per cent of the total ration. As total protein is increased, a higher proportion of methionine to calories seems to be required. The accuracy of this rule of thumb is limited by variability in the methionine and energy content of feedstuffs.

Practical applications of the new knowledge are being developed with large-scale feeding trials. For example, in a test involving 7,000 birds, three basic rations with three different energy values have been fed without supplementary methionine and with the calculated optimum amount added. In each case, the response in terms of feed efficiency and total weight gain approximated advance calculations.

These tests were conducted in a commercial broiler house in Lancaster County, Pa. and ran 69 days. There were 20 pens of 350 birds each -- a total of 7,000 birds (Vantress Cross, half male, half female). Standard commercial management practices were followed in regard to feeding, watering, litter, and vaccination. Mortality averaged 1.8 per cent for the entire experiment. In no pen did mortality exceed three per cent and there was no disease. The birds showed excellent feathering, pigmentation and general appearance, and brought top market price of 29½ cents per pound on the date of sale.

Each of the three rations (Rations A, B, and C) was essentially the same representative commercial broiler diet, containing approximately 21 per cent protein. However, they were modified to give three different calorie levels -- 908, 944 and 980 calories per pound respectively.

Ration A contained what the Stine Laboratory experiments had indicated was an adequate level of natural methionine for the calorie content (0.436 per cent). As predicted, there was no improvement in feed efficiency when 0.025 per cent methionine was added. Ration B, with 36 more calories per pound, showed a response to 0.04 per cent added methionine. Ration C showed a response to 0.05 per cent added methionine, but no additional advantage resulted when the methionine supplementation was raised to 0.07 per cent.

In summary, the energy level of a good broiler diet (Ration A) was increased by eight per cent and supplemented with the proper amount of methionine. The improved ration (Ration C) produced 52 pounds more meat per ton of feed. Even after paying for the changes, a broiler grower would find Ration C with the added methionine worth seven to 10 dollars more per ton than Ration A.

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Editor's Note: Details of the rations used and results of the experiment will be supplied on request.

EXPERIMENTERS' NOTATIONS

A Round-up of Data from Across the Nation

A little more documentation on the matter of flies losing their resistance to DDT was supplied recently by Paul Dahm, research entomologist at Iowa State College. He said that tests in the laboratory show some DDT-resistant flies lose their resistance in as little as eight months when they haven't had contact with DDT during that time. This loss of resistance has not yet been found in nature, but Dr. Dahm says it may occur if certain other types of insecticides are widely used for some time instead of DDT.

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"Good water management" is a phrase being stressed in agricultural practices in western states, where irrigation from ditches presents the problem of water loss through seepage. Elimination of weeds and other vegetation from ditch bottoms and sides, usually through use of weed killing chemicals, can be combined with lining the ditch with a waterproof material to cut much of this loss. In tests on the Davis campus of University of California, a plastic film lining was found to cut seepage losses 96 per cent, while an asphalt lining reduced losses by 36 per cent.

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Maneb -- the fungicidal material based on managanese ethylene bisdithiocarbamate and better known to growers as "Manzate" fungicide -- is rapidly finding a place in spray schedules for a number of crops. One of the largest eastern canning companies has this year recommended it for use at the rate of two pounds per 100 gallons of spray on carrot fields beginning when leaf spots are first noticed (usually in early August), and continued through September.

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Another maneb note comes from South Carolina where Dr. W. M. Epps at the Truck Experimental Station at Charleston has been conducting exhaustive fungicide tests in the control of cucumber diseases. His results to date show "Manzate" fungicide as either a dust or spray to be the best of many materials tested. In a spray formulation at the concentration of one and a half pounds of "Manzate" to 50 gallons of water per acre, it was particularly outstanding in the control of anthracnose.

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